

I CLAIM:

1. Apparatus for assisting in the computer-aided, substantially real-time diagnoses and treatments of vestibular disorders comprising

head-wearable frame structure adapted for wearing on a subject's head in a  
5 condition thereon of relative positional stability,

at least a pair of vestibular-parameter data-parameter devices selectively anchored/anchorable to said frame structure in conditions thereon of relative positional stability both with respect to the frame structure and with respect to one another, each said device being adapted to engage in at least one of the activities including (a)  
10 delivering to, and (b) receiving from, a subject's head vestibular-relevant parameter data, and

communication structure operatively connected to said devices, and operatively associable with appropriate computing structure, adapted to accommodate at least one of the tasks including (a) communicating parameter data to, and (b) communicating  
15 parameter data from, said devices relative to such an associated computing structure.

2. The apparatus of claim 1, wherein said devices are drawn from a list including (a) an electronic video image-collecting device, (b) a linear accelerometer, (c) an angular accelerometer, (d) a sound deliverer, (e) an air-pressure modifier directly  
20 coupleable to the ear, (f) fluid-flow structure directly coupleable to the ear, (g) light-emitting structure, (h) visual image-presenting structure, (i) an inclinometer, (j) evoked-potential electrode structure, (k) galvanic stimulus structure, (l) caloric stimulus structure, and (m) vibration-generating structure.

3. The apparatus of claim 2, wherein said sound deliverer comprises an elongate tubular body structure having a delivery end removably insertable into the ear, and an oblong, compliant, tubular and tapered insertion bulb fluid-sealingly joined to said delivery end, and possessing an outside surface which is directly and fluid-sealingly engageable with ear tissue with said body structure's said delivery end inserted into the ear.

4. The apparatus of claim 2, wherein said air-pressure modifier comprises an elongate tubular body structure having a delivery end removably insertable into the ear, and an oblong, compliant, tubular and tapered insertion bulb fluid-sealingly joined to said delivery end, and possessing an outside surface which is directly and fluid-sealingly engageable with ear tissue with said body structure's said delivery end inserted into the ear.

5. The apparatus of claim 2, wherein said sound deliverer and said air-pressure modifier share a common structure which comprises an elongate tubular body structure having a delivery end removably insertable into the ear, and an oblong, compliant, tubular and tapered insertion bulb fluid-sealingly joined to said delivery end, and possessing an outside surface which is directly and fluid-sealingly engageable with ear tissue with said body structure's said delivery end inserted into the ear.

6. The apparatus of claim 2, wherein said fluid-flow structure comprises an elongate, malleable, tubular fluid-flow body structure having a tympanic-membrane piercing end, and a digital manipulation, maneuvering-assist enlargement joined to said body at a location spaced from said end.

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7. Apparatus for assisting in the computer-aided, substantially real-time diagnoses and treatments of vestibular disorders comprising,

frame structure wearably securable to a subject's head in a manner causing the frame structure to function as a non-relative-motion unit with the head,

10 plural, different, data-parameter devices, each selectively anchored/anchorable to said frame structure in a manner causing it to function as a unit with the frame structure, and further to function without any relative motion permitted between it and another so-anchored/anchorable device, with each said device being adapted to engage in at least one of the activities including (a) delivering to, and (b) receiving from, a subject's head,  
15 different-parameter vestibular data which is relevant to diagnosis and treatment of a vestibular disorder, and

computing structure operatively connected to all so-anchored ones of said devices, adapted to share in the delivery and reception of such different-parameter data with those devices, said computing structure including algorithm structure which equips  
20 the computing structure to perform substantially real-time operations relative to such delivered and received, different-parameter data, including performing the operation of vestibular-disorder correlation and analysis of received data.

8. The apparatus of claim 7, wherein said devices are drawn from a list including (a) an electronic video image-collecting device, (b) a linear accelerometer, (c) an angular accelerometer, (d) a sound deliverer, (e) an air-pressure modifier directly coupleable to the ear, (f) fluid-flow structure directly coupleable to the ear, (g) light-emitting structure, (h) visual image-presenting structure, (i) an inclinometer, (j) evoked-potential electrode structure, (k) galvanic stimulus structure, (l) caloric stimulus structure, and (m) vibration-generating structure.

9. A method utilizing plural vestibular-parameter data communication devices for assisting in the computer-aided, substantially real-time diagnoses and treatments of vestibular disorders comprising

selecting for use plural ones of such devices,

anchoring selected devices to a head-wearable frame structure in conditions thereon of relative positional stability both with respect to the frame structure and with respect to one another, each such selected device being adapted to engage in at least one of the activities including (a) delivering to, and (b) receiving from, a subject's head vestibular-relevant parameter data,

securing the frame structure, bearing the anchored devices, to the head of a subject in a manner causing the secured frame structure to operate as a unit with the subject's head, and

establishing operative data-flow connections between the devices and a computing structure.

10. The method of claim 9, wherein the devices are selected from a list including (a) an electronic video image-collecting device, (b) a linear accelerometer, (c) an angular accelerometer, (d) a sound deliverer, (e) an air-pressure modifier directly coupleable to the ear, (f) fluid-flow structure directly coupleable to the ear, (g) light-emitting structure, (h) visual image-presenting structure, (i) an inclinometer, (j) evoked-potential electrode structure, (k) galvanic stimulus structure, (l) caloric stimulus structure, and (m) vibration-generating structure.

11. A method for preparing nystagmus-activity data for useful analysis regarding the desired diagnosis and prospective treatment of a subject's related vestibular disorder comprising

collecting from a subject data relative to the subject's observable nystagmus behavior,

acquiring, during said collecting, acceleration data generated by accompanying subject movement, and

utilizing such acquired acceleration data, differentiating physiologic and pathologic components of the collected nystagmus data, thus to isolate these two components recognizably from one another, and

following said differentiating, making available the recognizably isolated pathologic component for use respecting the desired diagnosis and prospective treatment.

12. The method of claim 11, wherein said collecting and acquiring are performed by relevant data sensors which are affixed in non-relative-motion stability conditions effectively to the subject's head.

5 13. The method of claim 12 which further includes applying, via the subject's head, selected vestibular-activity stimuli during said collecting and acquiring steps.

14. The method of claim 13, wherein said applying is performed utilizing selected stimulators which are affixed in non-relative-motion stability conditions  
10 effectively to the subject's head.

15 15. The method of claim 12, wherein the data sensors include a linear accelerometer, an angular accelerometer, and an electronic video image-collecting device which observes subject eye movement.

16. The method of claim 14, wherein the data sensors include a linear accelerometer, an angular accelerometer, and an electronic video image-collecting device which observes subject eye movement.

17. The method of claim 15, wherein the data sensors and stimulators, in addition to including the mentioned accelerometers and electronic video image-collecting device, are additionally drawn from a list including (a) a sound deliverer, (b) an air-pressure modifier directly coupleable to the ear, (c) fluid-flow structure directly coupleable to the ear, (d) light-emitting structure, (e) visual image-presenting structure, (f) an inclinometer, (g) evoked-potential electrode structure, (h) galvanic stimulus structure, (i) caloric stimulus structure, and (j) vibration-generating structure.

18. The method of claim 17 which further comprises utilizing the mentioned electronic video image-collecting device to observe nystagmus behavior while simultaneously delivering selected liquid to the ear employing the mentioned fluid-flow structure.

19. The method of claim 18 which additionally involves providing a controller for controlling the delivery of liquid to the ear by the fluid-flow structure, and utilizing data derived from observations made by electronic video image-collecting device of simultaneously observable nystagmus behavior to affect the controlling operation of the controller.

20. A system employable by an attendant user for diagnosing and treating a subject's vestibular disorder, said system, in operative condition, comprising

headgear worn by a subject, including frame structure seated with positional stability on the subject's head, and plural vestibular-disorder-relevant information sensors

5 and stimuli deliverers anchored with positional stability on said frame structure,

a computer armed with vestibular-disorder, expert-trained algorithm structure, and

data-flow and control interposition structure, including feedback structure,

operatively interposed said headgear, said computer, the subject, and the attending user,

operable, in relation to the expert-trained capabilities of said algorithm structure, (a) to

10 collect data from, and to effect the delivery of stimuli to, the subject via said headgear,

and further (b) to effect and control the engagement of selected diagnosing and treating

activities with respect to the subject, including initiating such effecting and controlling as

a feedback response to such collected data.

15 21. The system of claim 20, wherein the feedback response is one which furnishes diagnostic and/or treatment guidance to the attending user.

22. The system of claim 20, wherein the feedback response functions to effect changes in stimuli delivered to the subject.

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23. The system of claim 20, wherein the feedback response functions to effect changes in fluid-flow delivery as a stimulus to the subject.